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A tale of four theories

Around a decade ago the following four $(\mathbb{C}^*)^2$ -equivariant theories are proven to be equivalent: (1) Gromov-Witten theory of $\mathbb{P}^1 \times \mathbb{C}^2$ relative to three fibers; (2) Donaldson-Thomas theory of $\mathbb{P}^1 \times \mathbb{C}^2$ relative to three fibers; (3) Quantum cohomology of Hilbert schemes of points on \mathbb{C}^2 ; (4) Quantum cohomology of symmetric product stacks of \mathbb{C}^2 . In this talk we'll discuss these four equivalence. We'll also sketch some new development, namely higher genus extensions of these equivalences (joint work with R. Pandharipande).